THE DEVELOPMENT OF LEARNING MEDIA STATISTICS E-MODUL BASED ON EDMODO WITH REALISTIC APPROACH ORIENTED HOTS FOR GRADE XII STUDENTS OF SMK

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ABSTRACT

Insufficient teaching media cause a lack of students' interests in mathematics. Moreover, they have difficulty to understand more about statistics. Therefore, we need a teaching media for Statistics E-Modul. This research is aimed to develop teaching media, especially Statistics E-module for grade XII students of vocational high school (SMK). Furthermore, it is also aimed to know how feasible this E-module from a financial point of view and how good of students' responses to this media. The type of this research is development research. It uses research and development. They are elaborated in some stages, such a problem identification, data collection, product, and good design, product revision, trial usage, product revision, and mass production. The subject of this research is SMK N 1 Sanden and SMK 1 Muhammadiyah Bambanglipuro. Meanwhile, the object of the study is a statistics e-module based on Edmodo with a realistic approach oriented HOTS (Higher Order Thinking Skill) for grade XII students of vocational high school. There are two types of data. Those are qualitative and quantitative. The data collection uses interviews and questionnaires, which will be done before product development, is done. The instrument of the research is the guidelines of interview and questionnaire to rate the E-Module. The data analysis technique is a quantitative analysis that will be changed into qualitative analysis using a Likert scale. The research result showed that the result of scoring instrument from the expert with the average score 124.7 is in the level good. The result of the research showed that the result of the scoring instrument fro the expert with the average score 91.7 is in the level very good. Moreover, the instrument of students' responses with the average score 85.53 is in the level very good. Based on the scoring result from the expert, media expert, students' responses to the development of teaching media statistics e-module based on Edmodo with a realistic approach oriented HOTS (Higher Order Thinking Skill) for grade XII students of vocational high school is feasible to apply in the learning process.

Keywords: E-Modul, Statistics, Realistics Approach, HOTS.

INTRODUCTION

Education is a process of learning about the knowledge, skills, and habits of a group of people who are passed down from generation to generation through teaching, research, and training. Education is very important for a nation's progress and is one of the indicators determining the progress of a nation. However, the current condition of Indonesia's education is very sad. There are so many problems that exist in the world of Indonesian education. One way to overcome this problem is the need for competent teachers. Because one of the determinants of success in the learning process is the role of the teacher and the learning resources used. According to Law No. 20 of 2003 Chapter, Article 1, paragraph 20 states that Learning is the process of interaction of students with educators and learning resources in a learning environment. So it can be said that learning will succeed if the teacher is competent and the learning resources are well met.

Learning resources are all devices, whether objects, places, or the environment around students, to provide information or to learn for students to improve student learning achievement. Learning resources can be printed books, radio, television, learning media, modules, and others. With the development of technology, students can more easily obtain information, even more so by using the

internet. There are currently many learning applications developed, one of which is Edmodo. However, not many teachers use it as a support in teaching and learning activities.

Learning resources can be said as a medium of learning. Learning media can be interactive media, game media, or props. The position of this learning media is equivalent to learning resources. Learning media in the form of e-modules can also be categorized in learning resources. Arsyad Azhar (2017: 19) said that in the teaching and learning process, two essential elements are learning methods and learning media. In the learning methods, there are also approaches used by teachers in teaching. One approach that can make students understand the material by learning mathematics by daily life events is realistic. According to Gravemeijer (In Suhendar, 2016: 43), Realistic mathematics is rooted in Freudenthal's interpretation of mathematics as an activity. Suherman, Erman (2003: 146) states that In realistic philosophy, students are given tasks that approach reality, that is, from within students will expand the world of his life.

Based on the results of student questionnaire analysis, it is found that students still find it difficult to learn statistical material because, in this material, a lot of data processing in the form of numbers requires more accuracy, students are less interested in mathematics because of the lack of media use in the delivery of material, and also mathematics is still a scourge for students. Meanwhile, based on the results of the analysis of student work on HOTS questions, it was found that many students answered correctly because the HOTS questions given were still at an easy level. Based on interviews with mathematics teachers at SMK Negeri 1 Sanden and SMK Muhammadiyah 1 Bambanglipuro, teachers have not been maximized in developing learning media, both interactive media, teaching aids, and other teaching materials. The teacher still uses the lecture and discussion methods in the delivery of the material. Supporting media used are props. Some of these things underlie researchers to develop electronic e-modules in mathematics as a learning medium. The e-module developed is an Edmodo-based statistical e-module with a HOTS-oriented realistic approach for class XII SMK. The selection of e-modules as teaching material to be developed is because it is easily accessible, can be accessed anywhere and anytime as long as there is an internet network. Using the Edmodo application also makes it easier for students to communicate with teachers and other students when they encounter learning difficulties when studying independently at home. The addition of HOTS questions is done to increase students 'insights and increase students' skills in solving HOTS questions.

Based on this background, the following problems can be formulated: 1) How is the development of Edmodo-based statistical e-modules with a HOTS-oriented realistic approach for students of class XII SMK?. 2) What is the feasibility of the Edmodo-based statistical e-module with a HOTS-oriented realistic approach for students of class XII SMK?

The objectives of this research are: 1) We are developing Edmodo-based statistical e-modules with a HOTS-oriented realistic approach for students of class XII SMK. 2) It knows the feasibility of Edmodo-based statistical e-modules with a HOTS-oriented realistic approach for students of class XII SMK.

METHODS

This research is a type of research and development (Research and Development). Sugiyono (2016: 407) said that Research and development methods or in English Research and Development is a research method used to produce certain products, and test its effectiveness. The product produced in this study is e-module statistics based on Edmodo. A HOTS-oriented realistic approach for students of class XII SMK. Development of Edmodo-based statistical e-module mathematics teaching materials with HOTS-oriented realistic approach for students of class XII Vocational School by referring to the Research and Development development model with the following steps.

1. Potentials and Problems. The first step in this research procedure is to determine the potential and problems to be studied. These potentials and problems must be proven factually and up to date.

2. Data Collection. Data collection was carried out by giving questionnaires to students and HOTS questions as well as interviews with mathematics teachers at the school where the research was conducted.
3. Product Design. The third step is product design. Sugiyono (2016: 413) states that the results of research and development activities are in the form of new product designs, complete with specifications. In this development research, the resulting new product design is an e-module.
4. Design Validation. An expert must validate a product before it is used for testing. This is to ensure the validity of the product being developed. The design validation was carried out by two experts, namely a material expert and a media expert. Design validation generates input from material experts and media experts whose function is to improve the product.
5. Design Revision. After the material and media experts validated the design, the design was revised according to the input of the two experts in refining the product design.
6. Product Testing. As desired by the students, the revised product was then tried out on the students to get information for product improvement. In this test data collection was only carried out on a few students who were used as research samples. Students are asked to rate the product then provide criticism and suggestions regarding the product being developed.
7. Product Revisions. After testing the product, the next step is to revise the product. At the product revision stage, the product is revised according to product input during product testing. The results of this product revision will later be used when testing usage.
8. Trial Use. Products that have been revised are then tried again in the trial use stage. The trial use is carried out in a large class. This trial is used to determine the feasibility of the product.
9. Product Revisions. Products that have been tested are then revised again if there are still deficiencies.
10. Mass Production. Mass production is carried out to disseminate the end products that have been used.

This study's data analysis technique is to analyze the material expert questionnaire, media expert, and student responses that have been quantified through the following stages.

1. Quantifying Data. Step for converting qualitative data from a questionnaire into quantitative data. The measurement scale used in this study is a Likert scale. According to Sugiyono (2016: 135), the Likert scale is as follows:

Table 1. Likert scale

Information	Score
SA (Strongly Agree)	5
An (Agree)	4
QA (Quite Agree)	3
DA (Disagree)	2
SDA (Strongly Disagree)	1

2. Calculate Average. The data that has been collected is then calculated an average of each score assessment and then converted to qualitative data. Calculation of the average score according to Sukarjo (2006: 55), namely by the formula:

$$\bar{X} = \frac{\sum_{i=1}^{n} x_i}{n}$$

Information:

$\bar{X}$: average score

x_i: the score given by the respondent in item i

k: number of statements in the questionnaire

n: number of respondents

3. Determine the average score criteria in the ideal assessment criteria guidelines. At this stage, change the current average of each assessment to qualitative data according to each questionnaire's scale assessment criteria. Guidelines for the assessment criteria are as follows:

Table 2. Criteria for Ideal Rating Categories

Score	Quantitative Score Range	Qualitative Category
A	$\bar{X} > (\bar{X}_i + 1{,}8\ SB_i)$	Very good
B	$(\bar{X}_i + 0{,}6\ SB_i) < \bar{X} \leq (\bar{X}_i + 1{,}8\ SB_i)$	Well
C	$(\bar{X}_i - 0{,}6\ SB_i) < \bar{X} \leq (\bar{X}_i + 0{,}6\ SB_i)$	Pretty good
D	$(\bar{X}_i - 1{,}80\ SB_i) < \bar{X} \leq (\bar{X}_i - 0{,}6\ SB_i)$	Less
E	$\bar{X} \leq (\bar{X}_i - 1{,}8\ SB_i($	Very less

Information:

$\bar{X}$ = empirical score (average score)

$\bar{X}_i$= Ideal average

$\bar{X}_i = \frac{1}{2} \times$ (ideal maximum score + ideal minimum score)

SB_i= ideal standard deviation

$SB_i = \frac{1}{6} \times$ (ideal maximum score - ideal minimum score)

$\bar{X}$ = Empirical score (Average score)

Ideal maximum score = number of criteria items × the highest score

Ideal minimum score = number of criteria items × the lowest score

Highest score = 5

Lowest score = 1

a. Guidelines for the Expert Questionnaire Assessment Questionnaire

Table 3. Material Expert Assessment Category Criteria

Score	Quantitative Score Range	Qualitative Category
A	$\bar{X} > 126$	Very good
B	$102 < \bar{X} \leq 126$	Good
C	$78 < \bar{X} \leq 102$	Pretty good
D	$54 < \bar{X} \leq 78$	Less
E	$\bar{X} \leq 54$	Very less

b. Guidelines for Assessment of Media Expert Questionnaire

Table 4. Criteria for Media Expert Rating Categories

Score	Quantitative Score Range	Qualitative Category
A	$\bar{X} > 84$	Very good
B	$68 < \bar{X} \leq 84$	Good
C	$52 < \bar{X} \leq 68$	Pretty good
D	$36 < \bar{X} \leq 52$	Less
E	$\bar{X} \leq 36$	Very less

c. Guidelines for Evaluating Student Response Questionnaire

Table 5. Criteria for Evaluating Student Response Categories

Score	Quantitative Score Range	Qualitative Category
A	$\bar{X} > 84$	Very good
B	$68 < \bar{X} \leq 84$	Good
C	$52 < \bar{X} \leq 68$	Pretty good
D	$36 < \bar{X} \leq 52$	Less
E	$\bar{X} \leq 36$	Very less

RESULTS AND DISCUSSION

Based on the data analysis technique used, the data obtained from three assessments, namely the assessment of the material experts, media experts, and student responses, are as follows:

1. Analysis of the quality of e-modules in terms of the material was carried out by three material experts, namely Anggit Prabowo, M.Pd. Who is a lecturer in Mathematics Education at Ahmad Dahlan University, Titin Ruslinawati, S.Pd. As a mathematics study teacher in class XII of SMK Negeri 1 Sanden and teacher of mathematics study in class XII of SMK Muhammadiyah 1 Bambanglipuro, namely Mugiyati, S.Pd. The results of calculations of the quality of e-modules by material experts can be seen in the following Table 6.

Table 6. Results of Calculation of Feasibility Test Instruments by Material Experts

No	Name	Score	Qualitative Data Criteria
1	Anggit Prabowo, M.Pd.	115	Good
2	Titin Ruslinawati, S.Pd.	133	Very good
3	Mugiyati, S.Pd.	126	Good
Average		124,7	Good

Based on the results of the appraisal of the e-module by the material expert, it shows that the average score of the material expert assessment is 124.7. These results indicate that e-modules developed in terms of material are included in the Good category. So it can be said to be feasible in terms of material.

2. Analysis of the quality of e-modules in terms of media was carried out by three media experts, namely Syariful Fahmi, M.Pd. Who is a lecturer in Mathematics Education at Ahmad Dahlan University, Titin Ruslinawati, S.Pd. As a teacher of mathematics study in class XII of SMK Negeri 1 Sanden and teacher of mathematics study in class XII of SMK Muhammadiyah 1 Bambanglipuro, namely Mugiyati, S.Pd. The results of calculations of the quality of e-modules by media experts can be seen in Table 7 below:

Table 7. Results of the Calculation of Feasibility Test Instruments by Media Experts

No	Name	Score	Qualitative Data Criteria
1	Syariful Fahmi, M.Pd.	95	Very good
2	Titin Ruslinawati, S.Pd.	94	Very good
3	Mugiyati, S.Pd.	86	Good
Average		91.7	Very good

Based on the results of the appraisal of the e-module by the media experts, it shows that the average score of the media experts' assessment is 91.7. This shows that the e-modules developed are included in the Very Good category.

3. Analysis of the quality of e-modules in terms of student responses conducted by students of SMK Negeri 1 Sanden and SMK Muhammadiyah 1 Bambanglipuro. The results of calculations of the quality of e-modules by student responses can be seen in the following Table 8.

Table 8. Calculation of Student Response Feasibility Tests

No	school	Average	Category
1	SMK Negeri 1 Sanden	84,625	Very good
2	SMK Muhammadiyah 1 Bambanglipuro	85,975	Very good
Average		85.53	Very good

Based on the results of the e-module feasibility assessment by student responses, it shows that the average score is 85.53. This shows that the e-module is in the category of Very Good

CONCLUSION

Based on the research results on the development of Edmodo-based statistical e-modules with a realistic HOTS-oriented approach to class XII students that have been carried out, the following conclusions are obtained:

1. This research has developed Edmodo-based statistical e-module learning media with a HOTS-oriented realistic approach for students of class XII SMK by using the Research and Development (R&D) development model.
2. The feasibility of developing Edmodo-based statistical e-modules with a HOTS-oriented realistic approach for students of class XII SMK classified in the criteria both based on the calculation of the average score of material experts that is equal to 124.7, classified as very good criteria based on the average score of experts media by 91.7 and student responses with an average score of 85.53. Based on these results, it can be concluded that the Edmodo-based statistical e-module with a HOTS-oriented realistic approach for students of class XII Vocational Schools is said to be suitable for use in learning mathematics in schools.

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